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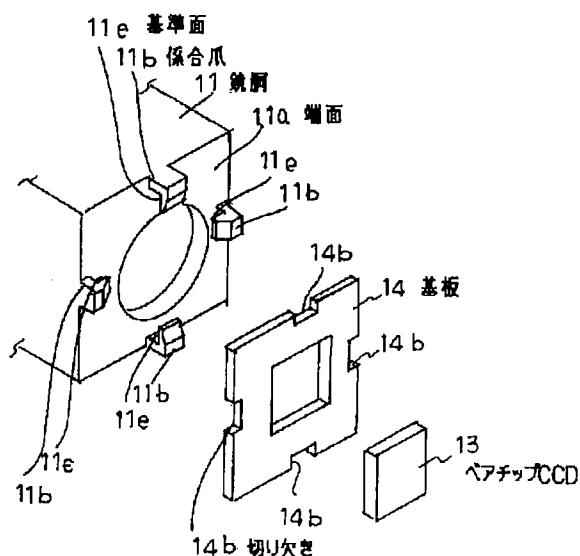
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(54) 【発明の名称】 ペアチップCCDの取付け方法

(57) 【要約】

【課題】 位置決めが容易なペアチップCCDの取付け方法を提供することを課題とする。

【解決手段】 ベアチップCCD 13を基板14に設け、基板14を光学系を支持する鏡胴11に取付けるベアチップCCDの取付け方法において、ベアチップCCD 13の位置決めは、基板14を鏡胴11に対して位置決めする。



## 【特許請求の範囲】

【請求項1】 ベアチップCCDを基板に設け、該基板を光学系を支持する鏡胴に取付けるベアチップCCDの取付け方法において、前記ベアチップCCDの位置決めは、前記基板を鏡胴に対して位置決めすることを特徴とするベアチップCCDの取付け方法。

【請求項2】 前記基板は、貫通した穴と該穴の周縁に形成された端子とを有し、前記ベアチップCCDは、前記基板の穴の開放面に対向する撮像面と、該撮像面の周縁に形成され、前記基板の端子に接続される端子とを有し、前記基板と前記ベアチップCCDとの隙間は充填剤で封止することを特徴とする請求項1記載のベアチップCCDの取付け方法。

【請求項3】 前記基板と前記鏡胴との取付けは、接着またはねじ止めのうち少なくともどちらか一方であることを特徴とする請求項1または2記載のベアチップCCDの取付け方法。

【請求項4】 前記基板のベアチップCCD取付け面と反対側の面に、前記穴の開放面を覆うように光学フィルタを取付けたことを特徴とする請求項1乃至3いずれかに記載のベアチップCCDの取付け方法。

【請求項5】 前記基板のベアチップCCD取付け面と反対側の面に、前記穴に嵌合する光学フィルタを設けたことを特徴とする請求項1乃至3いずれかに記載のベアチップCCDの取付け方法。

【請求項6】 前記フィルタは複数枚のフィルタからなる積層構造であり、基板側のフィルタは前記基板の貫通した穴に嵌合し、反基板側のフィルタは前記穴より大きな形状である段付き構造であることを特徴とする請求項4または5記載のベアチップCCDの取付け方法。

【請求項7】 前記接着は鏡胴の全周にわたってなされることを特徴とする請求項1乃至3いずれかに記載のベアチップCCDの取付け方法。

【請求項8】 前記基板の光軸に対して直交する平面内の位置決めは、前記ベアチップCCDからの画像をモニタリングしながら、前記基板を調整することを特徴とする請求項1記載のベアチップCCDの取付け方法。

【請求項9】 前記基板の光軸に対して直交する平面内の位置決めは、前記鏡胴と前記基板とに形成された位置決め構造で行なうことを行なうことを特徴とする請求項1記載のベアチップCCDの取付け方法。

【請求項10】 前記ベアチップCCDの光軸方向とあおり方向の位置決めは、前記鏡胴に設けられ、前記光軸の方向の位置決めがなされ、かつ、前記光軸に対して直交する平面に前記基板を突き当てるなどを特徴とする請求項1記載のベアチップCCDの取付け方法。

【請求項11】 前記鏡胴の内筒面に光学フィルタのベ

アチップCCDとの対向面と反対側の面が当接する係止部を設け、

前記光学フィルタのベアチップCCDとの対向面と前記基板との間に、前記鏡胴の内筒面に全周にわたって当接する弾性部材を圧入したことを特徴とする請求項9または10記載の記載のベアチップCCDの取付け方法。

【請求項12】 光学系で必要とするエリアより大きな有効画素エリアを有したベアチップCCDを用い、光軸に対して直交する平面内の調整を行なわないことを特徴とする請求項1記載のベアチップCCDの取付け方法。

【請求項13】 ピントずれ補正回路を付加し、あおり方向の位置調整を行なわないことを特徴とする請求項1記載のベアチップCCDの取付け方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、ベアチップCCDを基板に設け、該基板を光学系を支持する鏡胴に取付けるベアチップCCDの取付け方法に関する。

## 【0002】

【従来の技術】 次に、図面を用いて従来例を説明する。図23は従来のパッケージに封入されたCCDチップの取付け構造の一例を説明する図である。

【0003】 図において、1は光学系2を支持する鏡胴である。3はパッケージCCD4が設けられた基板で、鏡胴1の基端部に取付けられている。パッケージCCD4は一面が開放されたセラミック等の箱体5内にCCDチップ6が設けられ、箱体5の開放面を覆うガラス板7で前記CCDチップ6が箱体5内に封入されている。

【0004】 8は水晶フィルタや赤外カットフィルタ等からなる光学フィルタである。9は光学フィルタ8とパッケージCCD4との間に配設され、鏡胴1の内筒面に設けられた凸部1aに前記光学フィルタ8を押し付けて、光学フィルタ8の位置決めを行なうゴムや樹脂等の弾性部材である。

【0005】 又、ガラス板7上には、弾性部材9と光学フィルタ8とで構成される閉空間が形成されるので、ガラス板7上に塵埃等が付着するのを防止している。パッケージCCD4は、CCDチップ6と箱体5との位置決めがなされた状態で市場に供給される。従って、CCDチップ6の光学系2に対する位置決めは、位置決めが容易な箱体5を光学系2に対して位置決めすることによりなされていた。

## 【0006】

【発明が解決しようとする課題】 近年、パッケージCCD4の代りに、裸の状態のCCDチップ(ベアチップCCD)6の状態で市場に供給することが提案されている。このようないベアチップCCDの光学系に対する取付け方法は何等提案されていない。

【0007】 本発明は上記問題点に鑑みてなされたもの

で、その第1の目的は、位置決めが容易なペアチップCCDの取付け方法を提供することにある。また、本発明の第2の目的は、ペアチップCCDの撮像面に塵埃等が付着しないペアチップCCDの取付け方法を提供することにある。

#### 【0008】

【課題を解決するための手段】上記課題を解決する本発明のペアチップCCDの取付け方法は、ペアチップCCDを基板に設け、該基板を光学系を支持する鏡胴に取付けるペアチップCCDの取付け方法において、前記ペアチップの位置決めは、前記基板を鏡胴に対して位置決めするものである。

【0009】ペアチップCCDに比べ大きな基板を用いて位置決めを行なうことにより、位置決めが容易である。ここで、前記基板は、貫通した穴と該穴の周縁に形成された端子とを有し、前記ペアチップCCDは、前記基板の穴の開放面に対向する撮像面と、該撮像面の周縁に形成され、前記基板の端子に接続される端子とを有し、前記基板と前記ペアチップCCDとの隙間は充填剤で封止することが望ましい。

【0010】基板とペアチップCCDとの隙間を充填剤で封止したことにより、鏡胴外部から鏡胴内部への塵埃等の侵入を防止し、更に、ペアチップCCDへの塵埃等の付着を防止できる。

【0011】また、前記基板と前記鏡胴との取付けは、接着またはねじ止めのうち少なくともどちらか一方であることが望ましい。前記基板のペアチップCCD取付け面と反対側の面に、前記穴の開放面を覆うように光学フィルタを取付けてよい。

【0012】このようにすることで、ペアチップCCDの撮像面上に、穴の壁面と光学フィルタとで形成される閉空間が形成され、ペアチップCCDの撮像面への塵埃の付着が防止できる。

【0013】更に、CCDの撮像面と光学フィルタとの距離が、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタが解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0014】更に又、光学系と撮像面との距離が短くなることで、小型化または光学設計上の自由度が大きくなる。又、前記基板のペアチップCCD取付け面と反対側の面に、前記穴に嵌合する光学フィルタを設けるようにしてもよい。

【0015】このようにすることで、上記効果に加え、光学フィルタ自体の位置決めも容易となり、工数の削減、コスト低減に寄与する。更に、前記フィルタは複数枚のフィルタからなる積層構造であり、基板側のフィルタは前記基板の貫通した穴に嵌合し、反基板側のフィルタは前記穴より大きな形状である段付き構造としてもよい。

【0016】光学フィルタの穴に嵌合する部分の厚さを基板の穴の深さより短く設定することで、光学フィルタがペアチップCCDの撮像面に当たり、撮像面にキズや変形が発生する恐れがなくなる。

【0017】又、前記接着は鏡胴の全周にわたってなされることが望ましい。接着を鏡胴の全周にわたって行なうことで、基板と鏡胴との隙間から塵埃等が鏡胴内に侵入するのを防止できる。

【0018】基板の光軸に対して直交する平面内の位置決めの方法の第1の例として、前記ペアチップCCDからの画像をモニタリングしながら、前記基板を調整する方法があり、第2の例としては、前記鏡胴と前記基板とに形成された位置決め構造で行なうものがある。

【0019】更に、前記ペアチップCCDの光軸方向とあおり方向の位置決めは、前記鏡胴に設けられ、前記光軸の方向の位置決めがなされ、かつ、前記光軸に対して直交する平面に前記基板を突き当てる方法がある。

【0020】このように、光軸方向とあおり方向の位置決めを突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。更に、光軸方向の移動が規制されているので、光軸に対して直交する平面内の調整(回転、中心出し)が容易となる。

【0021】上記光軸とあおり方向の位置決めの一例としては、前記鏡胴の内筒面に光学フィルタのペアチップCCDとの対向面と反対側の面が当接する係止部を設け、前記光学フィルタのペアチップCCDとの対向面と前記基板との間に、前記鏡胴の内筒面に全周にわたって当接する弾性部材を圧入する方法がある。

【0022】このようにすることで、ペアチップCCDの撮像面上に、弾性部材と光学フィルタとで構成される閉空間が形成され、ペアチップCCDの撮像面への塵埃の付着が防止できる。

【0023】更に、ペアチップCCDの撮像面と光学フィルタとの距離が、従来のパッケージCCDを用いた場合に比べ箱体を用いていない分だけ短くでき、光学フィルタが解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0024】また、このような弾性部材は、図23に示すように従来のパッケージCCDの場合でも用いられているが、従来例の場合は、パッケージCCD4上を押接する構造となっているので、弾性部材の内径を大きく設定できない。しかし、本発明方法の弾性部材は、基板に押接するので、内径は大きく設定できる。従って、被写体光線と弾性部材の内壁との距離を大きくとることができ、光学的な問題点(フレア、ゴースト)が発生しにくい。

【0025】位置決めの方法としては、光学系で必要とするエリアより大きな有効画素エリアを有したペアチップCCDを用い、光軸に対して直交する平面内の調整を行なわない方法もある。

【0026】即ち、ラフに基板を鏡胴に取付けても、光学系で得られた画像が必ず撮像面に結像するような大きな撮像面を有するペアチップCCDを用い、不要な画像データは使用しないことにしておきたい。

【0027】又、ピントずれ補正回路を付加し、あおり方向の位置調整を行なわない方法もある。

【0028】

【発明の実施の形態】次に図面を用いて本発明の実施の形態を説明する。

#### (1) 第1の実施の形態例

図1は本発明の第1の実施の形態例の分解斜視図、図2は図1において組立て後の図、図3は図2における光軸方向の断面図、図4は図2におけるA方向矢視図、図5は図1における基板とペアチップCCDとの取付けを説明する図である。

【0029】これらの図において、11は光学系12を支持する断面形状が矩形の鏡胴である。14はペアチップCCD13が設けられた矩形の基板である。次に、ペアチップCCD13と基板14との取付けを、図5を用いて説明する。基板14には、貫通した穴14aが形成され、更に、穴14aの周縁には端子14bが形成されている。

【0030】一方、ペアチップCCD13は撮像面13aが基板14の穴14aの開放面に対向するように配設される。又、撮像面13aの周縁には、基板14の端子14bに半田15を用いて接続される端子13bが形成されている。

【0031】そして、基板14とペアチップCCD13との隙間は絶縁性を有する接着剤等の充填剤16で封止されている。次に、図1～図4を用いてペアチップCCD13が設けられた基板14と鏡胴11との取付け及び位置調整方法を説明する。矩形の基板14の各辺の略中央部には、矩形の切り欠き14bが形成されている。一方、鏡胴11の端面11a上には、基板14の各切り欠き14bに係合可能な4つの係合爪11bが形成されている。

【0032】これら各係合爪11bは、端面11aより光軸方向に延出し、断面形状が矩形の基部11cと、基部11cの先端部より光軸方向に向かって折曲し、基板14と対向する折曲部11dからとから構成されている。そして、基部11cの断面形状は、基板14の切り欠き14bより小さく設定されている。従って、係合爪11bが基板14に係合している状態でも、基板11bは鏡胴11の端面11a上で所定の範囲内で移動可能となっている。

【0033】又、折曲部11dの基板14との対向面は基準面11eとなっている。この基準面11eは、光軸に対して直交する平面であり、ペアチップCCD13が設けられた基板14が当接することにより、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の

位置決めがなされるものである。

【0034】又、図3に示すように、鏡胴11内には、水晶フィルタや赤外カットフィルタ等の光学フィルタ17が配設されている。鏡胴11の内筒面には、光学フィルタ17のペアチップCCD13との対向面と反対側の面が当接する係止部11fが設けられ、更に、光学フィルタ17のペアチップCCD13との対向面と基板14との間に、鏡胴11の内筒面に全周にわたって当接するゴムや樹脂等の弾性部材18が圧入されている。

【0035】次に、上記構成の調整方法を説明する。圧入された弾性部材18の弾性力により、ペアチップCCD13が設けられた基板14は係合爪11bの基準面11eに突き当たり(押接し)、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされる。

【0036】次に、基板13は鏡胴11の端面11a上で所定の範囲内で移動可能であるので、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、図4に示すように光軸に対して直交する平面内の調整(回転調整、中心出し調整)を行なう。尚、この回転調整、中心出し調整は、所定のテストパターンを撮像し、ペアチップCCD13からの画像データをモニターに表示し、調整を行なう。

【0037】そして、これらの調整が完了したならば、係合爪11bと基板14とを接着剤19を用いて接着する。上記方法によれば、ペアチップCCD13に比べ大きな基板14を用いて位置決めを行なうことにより、位置決めが容易となる。

【0038】又、圧入された弾性部材18の弾性力により、ペアチップCCD13が設けられた基板14は係合爪11bの基準面11eに突き当たり(押接し)、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、図16に示すように、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を容易に行なうことができる。

【0039】また、基板14とペアチップCCD13との隙間を充填剤で封止したことにより、鏡胴11外部から鏡胴11内部への塵埃等の侵入を防止し、更に、ペアチップCCD13の撮像面への塵埃等の付着を防止できる。

【0040】更に、光軸方向とあおり方向の位置決めを基板14の基準面11eへの突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。

【0041】更にまた、ペアチップCCD13の撮像面上に、弾性部材18と光学フィルタ17とで構成される閉空間が形成され、ペアチップCCD13の撮像面への塵埃の付着が防止できる。

【0042】また、ペアチップCCD13の撮像面と光学フィルタ17との距離が、箱体を使用していない分だけ、従来のパッケージCCDを用いた場合に比べ短くで

き、光学フィルタ17が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0043】更に、本実施の形態例での弾性部材18は、図23に示すような従来のパッケージCCDの場合でも用いられているが、従来例の場合は、パッケージCCD上を押接する構造となっているので、弾性部材の内径を大きく設定できない。しかし、本実施の形態例の弾性部材18は、基板14に押接するので、内径は大きく設定できる。従って、被写体光線と弾性部材の内壁との距離を大きくとることができ、光学的な問題点(フレア、ゴースト)が発生しにくい。

#### (2) 第2の実施の形態例

次に、図6を用いて本発明の第2の形態例を説明する。図6は第2の実施の形態例の主要部の構成図である。尚、本発明の第1の実施の形態例を説明する図1～図5と同一部分には同一符号を付し、それらの説明は省略する。

【0044】本実施の形態例と、第1の実施の形態例との相違点は、基板の光軸に対して直交する平面内の位置決めの方法である。具低的には、第1の実施の形態例では、基板14の光軸に対して直交する平面内の調整(回転調整、中心出し調整)は、所定のテストパターンを撮像し、ペアチップCCD13からの画像データをモニターに表示し、調整を行なった。

【0045】本実施の形態例では、図7に示すように、鏡胴11の基端面を基板14の光軸方向の基準面11jとし、基端面の一方の側面に水平方向の突き当て突起11hを、基端面の上面に垂直方向の突き当て突起11iを形成し、基板14にこれら突き当て突起11h, 11iに係合する切り欠き14h, 14iを形成した点である。

【0046】このような構成によれば、基板14を鏡胴11の基準面11jに押し付け、基板14の光軸方向の位置決めがなされた状態で、基板14の切り欠き11hが鏡胴11の基端面の突き当て突起11hが当接することで、基板14の水平方向の位置決めが、基板14の切り欠き11iが鏡胴11の基端面の突き当て突起11iが当接することで、基板14の垂直方向の位置決めが、また、基板の切り欠き14h, 14iが鏡胴11の突き当て突起11h, 11iに係合することで、基板14の回転方向の位置決めがそれぞれなされる。

【0047】尚、本実施の形態例は上記実施の形態例に限定するものではない。上記実施の形態例では、鏡胴11の基端面の一方の側面に水平方向の突き当て突起11hを、基端面の上面に垂直方向の突き当て突起11iを形成したが、鏡胴11の基端面の他方の端面に水平方向の突き当て突起を、基端面の下面に垂直方向の突き当て突起を形成してもよい。

【0048】また、上記位置決め機構において、突き当

て突起11h, 11i及び切り欠き14h, 14iの寸法精度を厳密にしなくとも、基板14の中心位置決めは、鏡胴11の光学系の撮像エリアを大きめに設定したり、また、後述の第12の実施の形態例で説明するCCDの撮像エリアを大きめに設定したりすることにより、回避できる。

#### (3) 第3の実施の形態例

次に、図7を用いて本発明の第3の形態例を説明する。図7は第3の実施の形態例の主要部の構成図である。尚、本発明の第2の実施の形態例を説明する図6と同一部分には同一符号を付し、それらの説明は省略する。

【0049】本実施の形態例と、第2の実施の形態例との相違点は、鏡胴11に2つの突起11k, 11lを形成し、基板14に鏡胴11の突起11kに係合する切り欠き穴14kと、鏡胴11の突起11lに係合する穴11lを形成した点である。

【0050】上記構成によれば、基板14を鏡胴11の基準面11jに押し付け、基板14の光軸方向の位置決めがなされた状態で、基板14の切り欠き穴14k, 14lが鏡胴11の突起11k, 11lに嵌合することで、基板14の光軸に対して垂直な平面上の位置決め(回転調整、中心出し調整)がなされる。

【0051】また、第2の実施の構成例と同様に、上記位置決め機構において、突き当て突起11h, 11i及び切り欠き14h, 14iの寸法精度を厳密にしなくとも、基板14の中心位置決めは、鏡胴11の光学系の撮像エリアを大きめに設定したり、また、後述の第12の実施の形態例で説明するCCDの撮像エリアを大きめに設定したりすることにより、回避できる。

#### (4) 第4の実施の形態例

次に、図8及び図9を用いて第4の実施の形態例を説明する。図8は第4の実施の形態例の断面構成図、図9は図8における主要部分の斜視図である。

【0052】尚、図8及び図9において、第1の実施の形態例の図1から図5と同一部分には同一符号を付し、それらの説明は省略する。これらの図において、鏡胴21の端面は、光軸に対して直交する平面であり、ペアチップCCD13が設けられた基板14が当接することにより、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされる基準面21aとなっている。

【0053】次に、上記構成の調整方法を説明する。ペアチップCCD13が設けられた基板14を鏡胴21の基準面21aに突き当てた状態で、即ち、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を行なう。尚、この回転調整、中心出し調整は、所定のテストパターンを撮像し、ペアチップCCD13からの画像データをモニターに表示し、調整を行なう。

【0054】そして、これらの調整が完了したならば、鏡胴21と基板14との境界部分を全周にわたって接着剤22を用いて接着する。上記方法によれば、ペアチップCCD13に比べ大きな基板14を用いて位置決めを行なうことにより、位置決めが容易となる。

【0055】又、基板14を鏡胴21の基準面21aに突き当て、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を容易に行なうことができる。

【0056】鏡胴21と基板14との境界部分を全周にわたって接着剤22を用いて接着したことにより、また、基板14とペアチップCCD13との隙間を充填剤で封止したことにより、鏡胴11外部から鏡胴11内部への塵埃等の侵入を防止し、更に、ペアチップCCD13の撮像面への塵埃等の付着を防止できる。

【0057】更に、光軸方向とあおり方向の位置決めを基板14の基準面21aへの突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。

【0058】また、ペアチップCCD13の撮像面と光学フィルタ17との距離が、箱体を使用していない分だけ、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタ17が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

#### (5) 第5の実施の形態例

次に、図10を用いて第5の実施の形態例を説明する。図10は第5の実施の形態例を説明する断面図である。尚、図10において、第1の実施の形態例の図1から図5と同一部分には同一符号を付し、それらの説明は省略する。

【0059】これらの図において、鏡胴31の端面は、光軸に対して直交する平面であり、ペアチップCCD13が設けられた基板14が当接することにより、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされる基準面31aとなっている。この基準面31aには、同一円周上に略同一ピッチで複数のめねじ穴31bが形成されている。

【0060】また、基板14にも、めねじ穴31bに向する穴14dが形成されている。尚、穴14dはめねじ穴31bの径より大きな幅の円弧状の長穴となっている。次に、上記構成の調整方法を説明する。ペアチップCCD13が設けられた基板14を鏡胴31の基準面31aに突き当たる状態で、即ち、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を行なう。尚、この回転調整、中心出し調整は、所定のテストパターンを撮像し、ペアチップCCD13からの画像データをモニターに表示し、

調整を行なう。

【0061】そして、これらの調整が完了したならば、めねじ穴31bに螺合可能なねじ32及びスプリングワッシャ33を用いて、基板14を鏡胴31に固定する。更に、鏡胴31と基板14との境界部分を全周にわたって接着剤34を塗布する。

【0062】上記方法によれば、ペアチップCCD13に比べ大きな基板14を用いて位置決めを行なうことにより、位置決めが容易となる。又、基板14を鏡胴31の基準面31aに突き当て、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を容易に行なうことができる。

【0063】鏡胴21と基板14との境界部分を全周にわたって接着剤22を用いて塗布したことにより、また、基板14とペアチップCCD13との隙間を充填剤で封止したことにより、鏡胴11外部から鏡胴11内部への塵埃等の侵入を防止し、更に、ペアチップCCD13の撮像面への塵埃等の付着を防止できる。

【0064】更に、光軸方向とあおり方向の位置決めを基板14の基準面31aへの突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。

【0065】また、ペアチップCCD13の撮像面と光学フィルタ17との距離が、箱体を使用していない分だけ、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタ17が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0066】尚、本発明は上記実施の形態例に限定するものではない。上記実施の形態例では、基板14と鏡胴31との取付けは、ねじ32のめねじ穴31bへの螺合により行なったが、タッピングねじを用いて基板14と鏡胴31との取付けを行なってもよい。

#### (6) 第6の実施の形態例

次に、図11及び図12を用いて第6の実施の形態例を説明する。図11は第6の実施の形態例の断面構成図、図12は図11における主要部分の斜視図である。尚、図11及び図12において、第4の実施の形態例の図8及び図9と同一部分には同一符号を付し、それらの説明は省略する。

【0067】本実施の形態例と第4の実施の形態例との相違点は、光学フィルタ17と基板14との間に鏡胴21の内壁面全周にわたって当接する弾性部材41を圧入し、接着剤42を用いた基板14と鏡胴21との取付けは、接着剤42を鏡胴の全周にわたって塗布するのではなく、図12に示すように、要所要所(具体的には、各辺の略中央部近傍)にとどめた点である。

【0068】上記方法によれば、ペアチップCCD13に比べ大きな基板14を用いて位置決めを行なうことによ

り、位置決めが容易となる。又、基板14を鏡胴21の基準面21aに突き当て、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を容易に行なうことができる。

【0069】また、基板14とペアチップCCD13との隙間を充填剤で封止したことにより、鏡胴11外部から鏡胴11内部への塵埃等の侵入を防止し、更に、ペアチップCCD13の撮像面への塵埃等の付着を防止できる。

【0070】更に、光軸方向とあおり方向の位置決めを基板14の基準面21aへの突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。

【0071】更にまた、ペアチップCCD13の撮像面上に、弾性部材41と光学フィルタ17とで構成される閉空間が形成され、ペアチップCCD13の撮像面への塵埃の付着が防止できる。

【0072】また、ペアチップCCD13の撮像面と光学フィルタ17との距離が、箱体を使用していない分だけ、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタ17が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0073】更に、本実施の形態例での弾性部材41は、図23に示すような従来のパッケージCCDの場合でも用いられているが、従来例の場合は、パッケージCCD上を押接する構造となっているので、弾性部材の内径を大きく設定できない。しかし、本実施の形態例の弾性部材41は、基板14に押接するので、内径は大きく設定できる。従って、被写体光線と弾性部材の内壁との距離を大きくとることができ、光学的な問題点(フレア、ゴースト)が発生しにくい。

#### (7) 第7の実施の形態例

次に、図13を用いて第7の実施の形態例を説明する。図13は第7の実施の形態例の断面構成図である。尚、図13において、第5の実施の形態例の図10と同一部分には同一符号を付し、それらの説明は省略する。

【0074】本実施の形態例と第5の実施の形態例との相違点は、光学フィルタ17と基板14との間に鏡胴21の内壁面全周にわたって当接する弾性部材51を圧入し、第5の実施の形態例のような接着剤の鏡胴全周にわたる塗布を行なわない点である。

【0075】上記方法によれば、ペアチップCCD13に比べ大きな基板14を用いて位置決めを行なうことにより、位置決めが容易となる。又、基板14を鏡胴31の基準面31aに突き当て、ペアチップCCD13の撮像面の光軸方向の位置決め及びあおり方向の位置決めがなされた状態で、光軸に対して直交する平面内の調整(回転調整、中心出し調整)を容易に行なうことができる。

【0076】また、基板14とペアチップCCD13との

隙間を充填剤で封止したことにより、鏡胴11外部から鏡胴11内部への塵埃等の侵入を防止し、更に、ペアチップCCD13の撮像面への塵埃等の付着を防止できる。

【0077】更に、光軸方向とあおり方向の位置決めを基板14の基準面31aへの突き当てとしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。

【0078】更にまた、ペアチップCCD13の撮像面上に、弾性部材51と光学フィルタ17とで構成される閉空間が形成され、ペアチップCCD13の撮像面への塵埃の付着が防止できる。

【0079】また、ペアチップCCD13の撮像面と光学フィルタ17との距離が、箱体を使用していない分だけ、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタ17が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0080】更に、本実施の形態例での弾性部材41は、図23に示すような従来のパッケージCCDの場合でも用いられているが、従来例の場合は、パッケージCCD上を押接する構造となっているので、弾性部材の内径を大きく設定できない。しかし、本実施の形態例の弾性部材41は、基板14に押接するので、内径は大きく設定できる。従って、被写体光線と弾性部材の内壁との距離を大きくとることができ、光学的な問題点(フレア、ゴースト)が発生しにくい。

#### (8) 第8の実施の形態例

図14及び図15を用いて第8の実施の形態例を説明する。図14は第8の実施の形態例の断面構成図、図15は図14における斜視図である。尚、図14及び図15において、第1の実施の形態例における図5と同一部分には、同一付後を付し、それらの説明は省略する。

【0081】本実施の形態例は、光学フィルタの取付け方法である。即ち、第1～第7の実施の形態例における光学フィルタは鏡胴の内壁面に取付けられるものであった。本実施の形態例においては、図14及び図15に示すように、基板14のペアチップCCD取付け面と反対側の面に、穴14aの開放面を覆うように光学フィルタ61を接着剤62を用いて取付けたものである。

【0082】このようにすることで、ペアチップCCD13の撮像面上に、穴14aの壁面と光学フィルタ61とで形成される閉空間が形成され、ペアチップCCD13の撮像面への塵埃の付着が防止できる。

【0083】更に、ペアチップCCD13の撮像面と光学フィルタ61との距離が、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタ61が解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0084】更に又、光学系と撮像面との距離が短くなることで、小型化または光学設計上の自由度が大きくな

る。

#### (9) 第9の実施の形態例

図16及び図17を用いて第9の実施の形態例を説明する。図16は第9の実施の形態例の断面構成図、図17は図16における斜視図である。尚、図16及び図17において、第1の実施の形態例における図5と同一部分には、同一付後を付し、それらの説明は省略する。本実施の形態例も、光学フィルタの取付け方法である。

【0085】本実施の形態例においては、図16及び図17に示すように、基板14のペアチップCCD13取付け面と反対側の面に、穴14aに嵌合する光学フィルタ71を設けるようにした。

【0086】このようにすることで、このようにすることで、第8の実施の形態例における効果に加え、光学フィルタ自体の位置決めも容易となり、工数の削減、コスト低減を図ることができる。

#### (10) 第10の実施の形態例

図18及び図19を用いて第10の実施の形態例を説明する。図18は第10の実施の形態例の断面構成図、図19は図18における斜視図である。尚、図18及び図17において、第1の実施の形態例における図5と同一部分には、同一付後を付し、それらの説明は省略する。本実施の形態例も、光学フィルタの取付け方法である。

【0087】光学フィルタ81は複数枚のフィルタからなる積層構造である。よって、基板14側の光学フィルタ81は基板14の貫通した穴14aに嵌合し、反基板側の光学フィルタ81は穴14aより大きな形状である段付き構造とした。

【0088】このようにすることで、第9の実施の形態例の効果に加え、光学フィルタ81の穴14aに嵌合する部分の厚さtを基板の穴の深さ(D)より短く設定することで、光学フィルタ81がペアチップCCD13の撮像面に当たり、撮像面にキズや変形が発生する恐れがなくなる。

#### (11) 第11の実施の形態例

図20を用いて第11の実施の形態例を説明する。図20は第11の実施の形態例の構成図である。

【0089】図において、91は鏡胴、92はペアチップCCD93が設けられた基板である。基板92は撮像装置本体に設けられ、光軸に対して垂直な平面上で移動可能となっている。

【0090】94は基板92を光軸に対して略垂直な平面上において、水平方向に付勢するスプリング、95は基板92の水平方向の移動を禁止するねじである。96は基板92を光軸に対して垂直な平面上において、垂直方向に付勢するスプリング、97は基板92の垂直方向の移動を禁止するねじである。

【0091】98,99,100は基板92を光軸に対して垂直な平面上において、あおり方向に付勢するスプリング、101,102,103はこれらスプリング98,

99,100に対向するように設けられ、スプリング98,99,100によってあおられた基板92の移動を規制するねじである。

【0092】このような構成においてのペアチップCCD93の位置調整方法を説明する。まず、基板92の光軸に対して垂直な平面上の位置調整を行なう。具体的には、所定のテストパターンをペアチップCCD93を用いて撮影し、ペアチップCCD93からの映像右信号を映像信号処理回路104を介してモニター105に写す。このモニター105の画像を見ながら、各ねじ95,97,101,102,103を調整し、あおり、中心位置調整を行なう。

【0093】次に、鏡胴91と基板92を固定し、鏡胴91を回転させることにより、回転調整を行ない、最後に鏡胴回転止めねじ106を締めて、調整を終了する。このように方法によれば、ペアチップCCD93に比べ大きな基板92を用いて位置決めを行なうことにより、位置決めが容易となる。

【0094】尚、本実施例で、ペアチップCCD93と基板92との取付けにおいて、両者の平行度が良好な場合は、あおりの調整が不要となり、スプリング98,99,100及びねじ101,102,103は不要となる。

#### (12) 第12の実施の形態例

図21を用いて第12の実施の形態例を説明する。図21は第12の実施の形態例の構成図である。尚、第11の実施の形態例を説明する図20と同一部分には同一符号を付し、それらの説明は省略する。

【0095】本実施の形態例は、基板110上に設けられるペアチップCCD111は光学系で必要とするエリアCより大きな有効画素エリアDを有している。このような方法によれば、ラフに基板110を鏡胴に取付けても、光学系で得られた画像が必ず撮像面に結像するような大きな有効画素エリアDを有するペアチップCCD111を用い、不要な画像データは使用しないことにすれば、ペアチップCCD111の光軸に対して直交する平面内の位置調整を不要とすることができます。

#### (13) 第13の実施の形態例

図22を用いて第13の実施の形態例を説明する。図22は第13の実施の形態例の構成図である。尚、第12の実施の形態例を説明する図21と同一部分には同一符号を付し、それらの説明は省略する。

【0096】近年、ピントのずれた画像やカメラの手振れの影響で劣化した画像からシャープな画像を復元する手法が提案されている(例えば、ブラインドデコンボリューションによる像回復/小松進一/早稲田大学,1991年第22回画像工学コンファレンス)。

【0097】本実施例は、A/D変換回路121及びこの手法を用いたピントずれ補正回路120を用いて、ペアチップCCD111の映像出力を補正するものである。このようにすることにより、ペアチップCCD111は光軸

中心に取付ける際に、あおり方向はある程度ラフに取付けても、ピントずれ補正回路120により、あおりによって劣化した像の回復を行なうことができる。

#### 【0098】

【発明の効果】以上述べたように本発明のペアチップCCDの取付け方法によれば、ペアチップCCDに比べ大きな基板を用いて位置決めを行なうことにより、位置決めが容易である。

【0099】基板とペアチップCCDとの隙間を充填剤で封止したことにより、鏡胴外部から鏡胴内部への塵埃等の侵入を防止し、更に、ペアチップCCDへの塵埃等の付着を防止できる。

【0100】前記基板のペアチップCCD取付け面と反対側の面に、前記穴の開放面を覆うように光学フィルタを取り付けることにより、ペアチップCCDの撮像面上に、穴の壁面と光学フィルタとで形成される閉空間が形成され、ペアチップCCDの撮像面への塵埃の付着が防止できる。

【0101】更に、CCDの撮像面と光学フィルタとの距離が、従来のパッケージCCDを用いた場合に比べ短くでき、光学フィルタが解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0102】更に又、光学系と撮像面との距離が短くなることで、小型化または光学設計上の自由度が大きくなる。又、前記基板のペアチップCCD取付け面と反対側の面に、前記穴に嵌合する光学フィルタを設けることにより、上記効果に加え、光学フィルタ自体の位置決めも容易となり、工数の削減、コスト低減に寄与する。

【0103】更に、前記フィルタは複数枚のフィルタからなる積層構造であり、基板側のフィルタは前記基板の貫通した穴に嵌合し、反基板側のフィルタは前記穴より大きな形状である段付き構造としたことにより、光学フィルタの穴に嵌合する部分の厚さを基板の穴の深さより短く設定することで、光学フィルタがペアチップCCDの撮像面に当たり、撮像面にキズや変形が発生する恐れがなくなる。

【0104】接着を鏡胴の全周にわたって行なうことと、基板と鏡胴との隙間から塵埃等が鏡胴内に侵入するのを防止できる。更に、前記ペアチップCCDの光軸方向とあおり方向の位置決めは、前記鏡胴に設けられ、前記光軸の方向の位置決めがなされ、かつ、前記光軸に対して直交する平面に前記基板を突き当てる方法がある。

【0105】このように、光軸方向とあおり方向の位置決めを突き当てしたことにより、接着等の方法における経時変化、湿度等の伸縮による影響が少なくなる。更に、光軸方向の移動が規制されているので、光軸に対して直交する平面内の調整(回転、中心出し)が容易となる。

【0106】上記光軸とあおり方向の位置決めの一例としては、前記鏡胴の内筒面に光学フィルタのペアチップCCDとの対向面と反対側の面が当接する係止部を設け、前記光学フィルタのペアチップCCDとの対向面と前記基板との間に、前記鏡胴の内筒面に全周にわたって当接する弾性部材を圧入する方法がある。

【0107】このようにすることで、ペアチップCCDの撮像面上に、弾性部材と光学フィルタとで構成される閉空間が形成され、ペアチップCCDの撮像面への塵埃の付着が防止できる。

【0108】更に、ペアチップCCDの撮像面と光学フィルタとの距離が、従来のパッケージCCDを用いた場合に比べ箱体を用いていない分だけ短くでき、光学フィルタが解折によるローパスフィルタの場合、解析効果が大きくなり、モアレの発生を抑えることができる。

【0109】また、このような弾性部材は、図23に示すように従来のパッケージCCDの場合でも用いられているが、従来例の場合は、パッケージCCD4上を押接する構造となっているので、弾性部材の内径を大きく設定できない。しかし、本発明方法の弾性部材は、基板に押接するので、内径は大きく設定できる。従って、被写体光線と弾性部材の内壁との距離を大きくとることができ、光学的な問題点(フレア、ゴースト)が発生しにくい。

【0110】位置決めの方法としては、光学系で必要とするエリアより大きな有効画素エリアを有したペアチップCCDを用い、光軸に対して直交する平面内の調整を行なわない方法もある。

【0111】即ち、ラフに基板を鏡胴に取付けても、光学系で得られた画像が必ず撮像面に結像するような大きな撮像面を有するペアチップCCDを用い、不要な画像データは使用しないことにはすればよい。

【0112】又、ピントずれ補正回路を附加し、あおり方向の位置調整を行なわない方法もある。

#### 【図面の簡単な説明】

【図1】本発明の第1の実施の形態例の分解斜視図である。

【図2】図1において組立て後の図である。

【図3】図2における光軸方向の断面図である。

【図4】図2におけるA方向矢視図である。

【図5】図1における基板とペアチップCCDとの取付けを説明する図である。

【図6】第2の実施の形態例の主要部の構成図である。

【図7】第3の実施の形態例の主要部の構成図である。

【図8】第4の実施の形態例の断面構成図である。

【図9】図8における主要部分の斜視図である。

【図10】第5の実施の形態例の断面構成図である。

【図11】第6の実施の形態例の断面構成図である。

【図12】図11における主要部分の斜視図である。

【図13】第7の実施の形態例の断面構成図である。

【図14】第8の実施の形態例の断面構成図である。

【図15】図14における斜視図である。

【図16】第9の実施の形態例の断面構成図である。

【図17】図16における斜視図である。

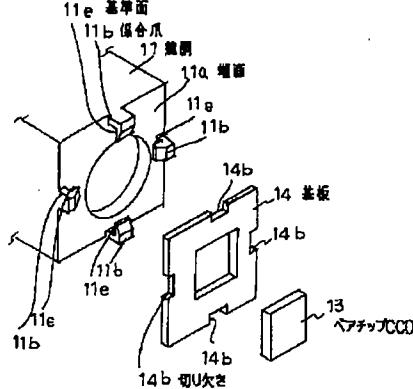
【図18】第10の実施の形態例の断面構成図である。

【図19】図18における斜視図である。

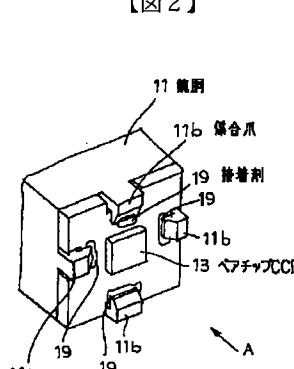
【図20】第11の実施の形態例の構成図である。

【図2.1】第12の実施の形態例の構成図である。

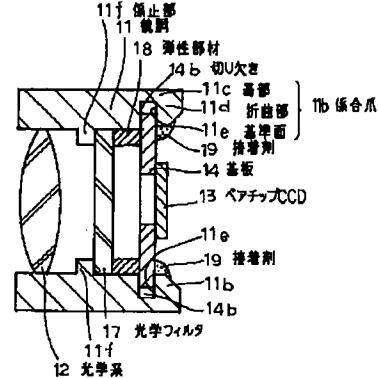
【四】



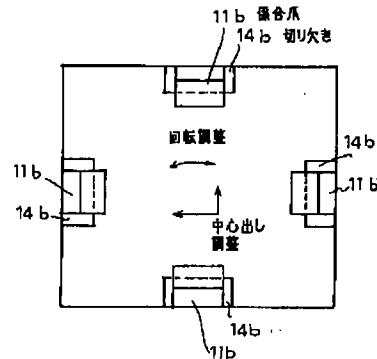
【図4】



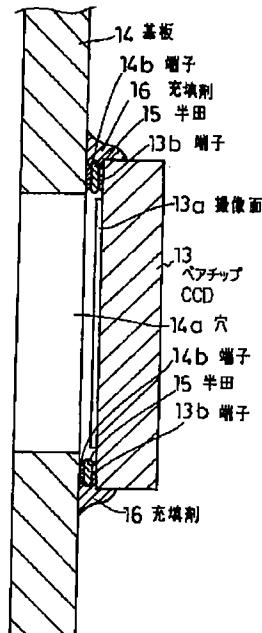
【图 5】



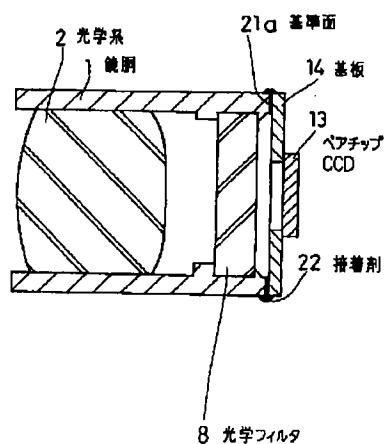
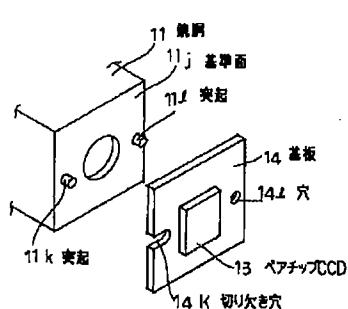
【图6】



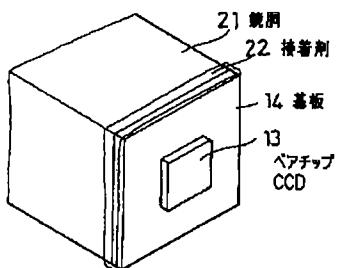
【図7】



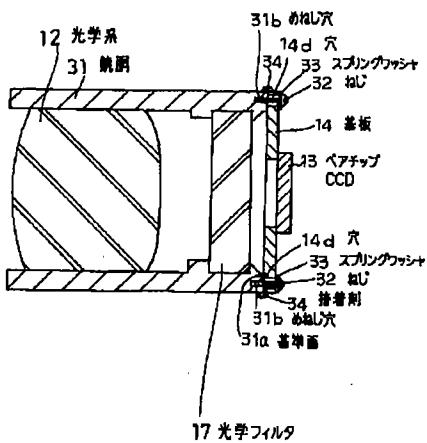
(图 8)



【図9】

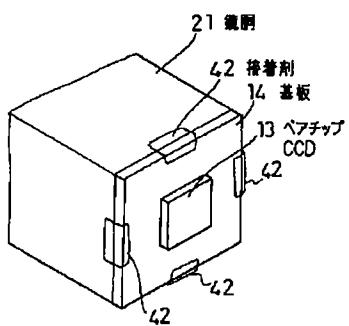
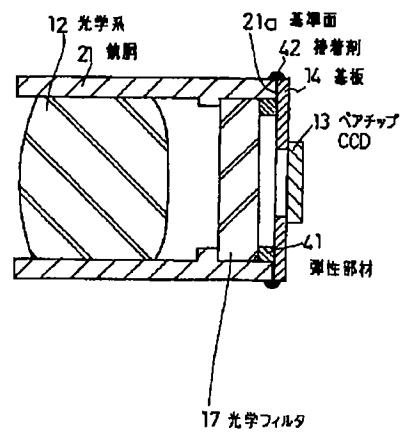


【図12】

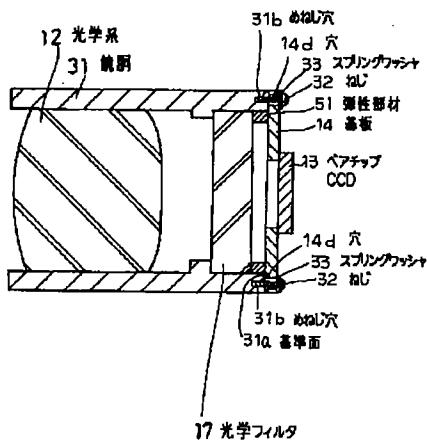


【図10】

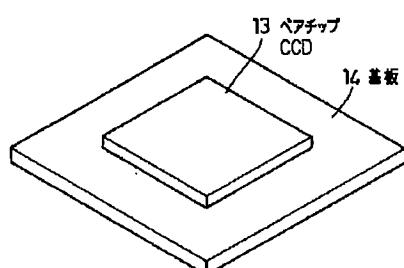
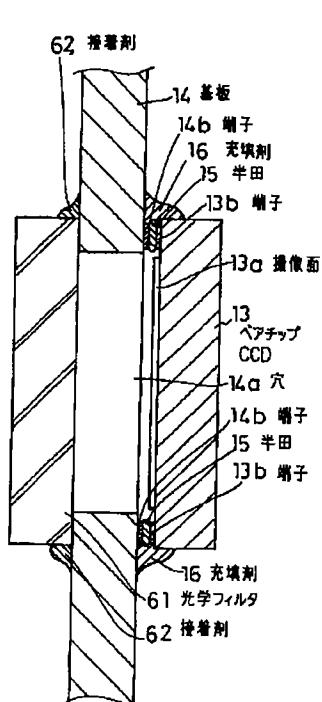
【図11】



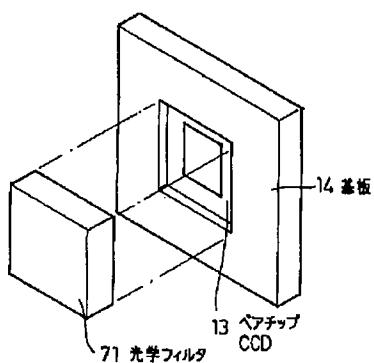
【図13】



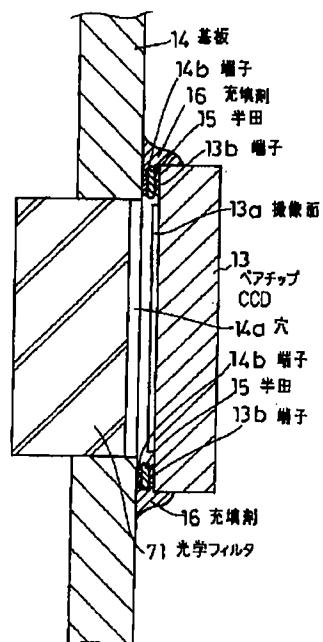
【図15】



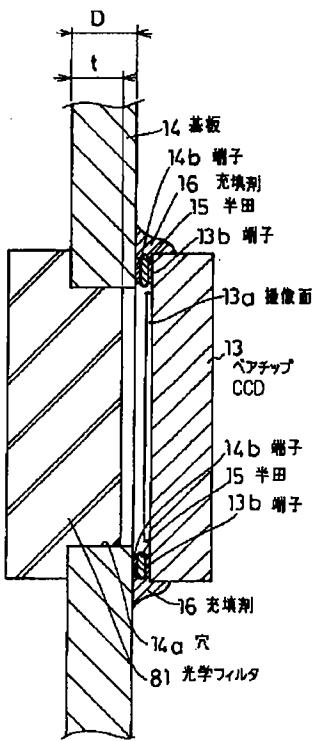
【図17】



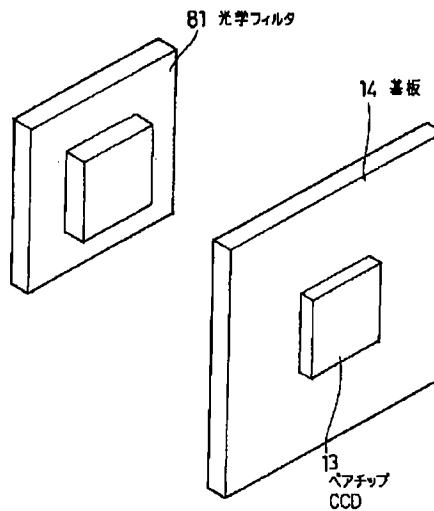
【図16】



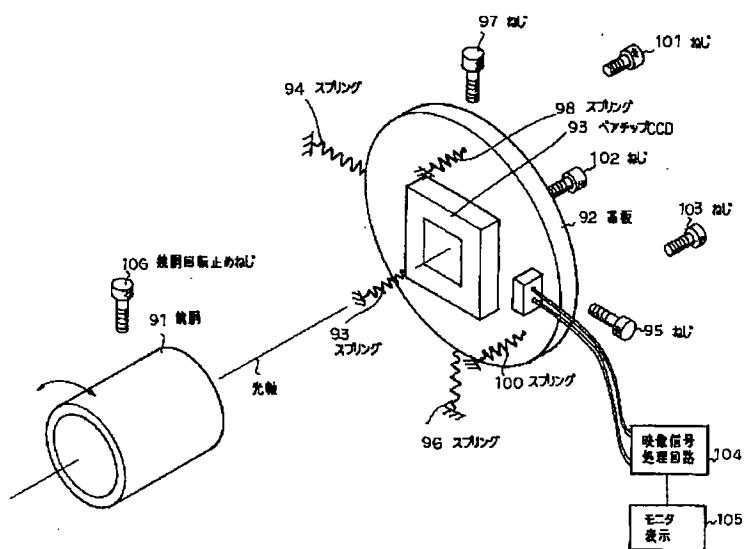
【図18】



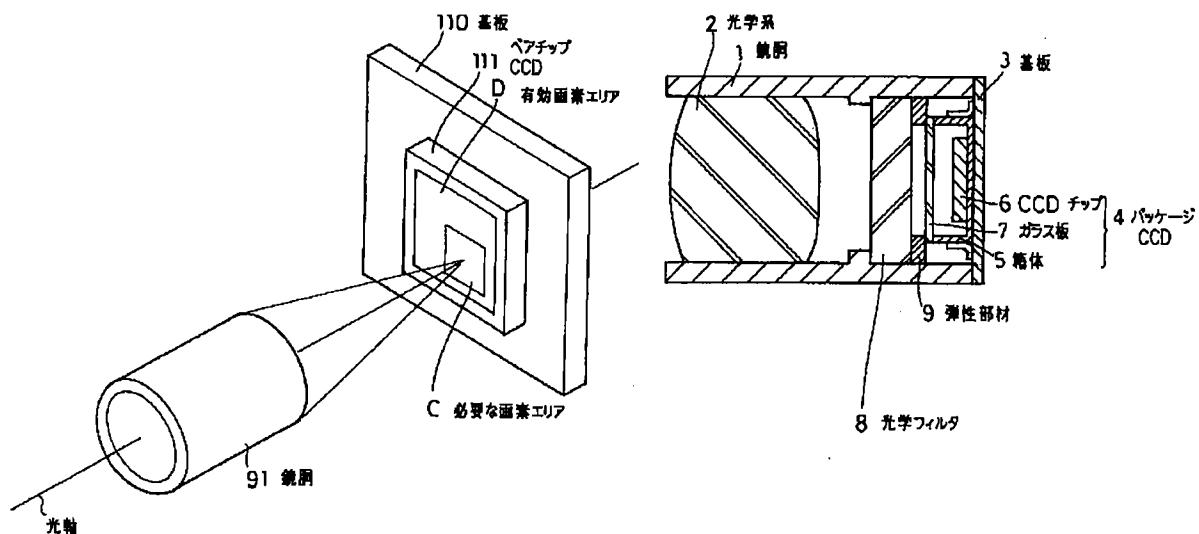
【図19】



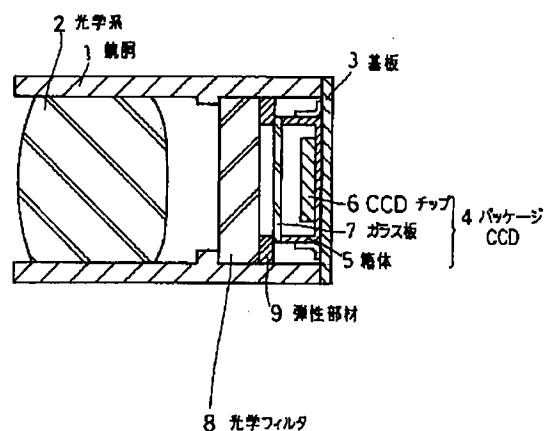
【図20】



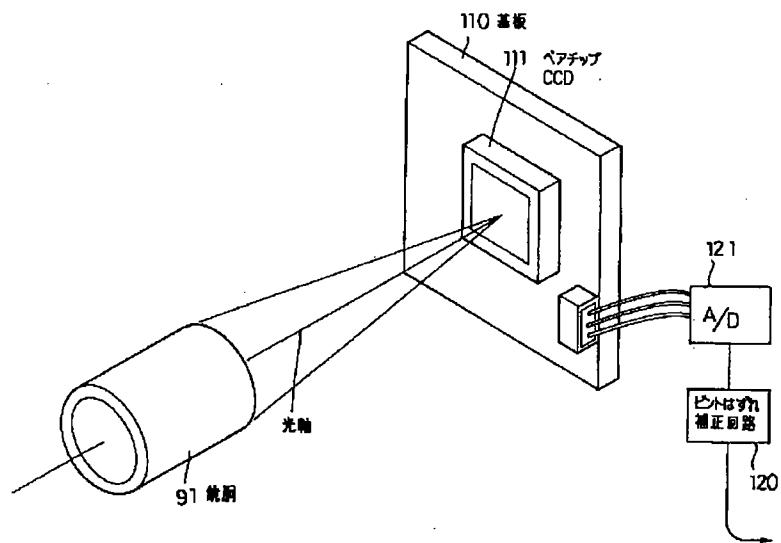
【図21】



【図23】



【図22】



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(22)Date of filing : 07.11.1995 (72)Inventor : HASEGAWA YUJI

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#### (54) MOUNTING OF BARE CHIP CCD

(57)Abstract:

PROBLEM TO BE SOLVED: To facilitate a positioning for mounting a bare chip CCD by a method wherein the bare chip CCD is provided on a substrate and the substrate is positioned to a lens tube.

SOLUTION: A substrate 14 provided with a bare chip CCD 13 is butted against (is press-contacted to) the reference surface 11e of an engaging pawl 11b by the elastic force of an elastic member pressed into a lens tube and a positioning in an optical axis direction of the imaging surface of the CCD 13 and a positioning in a fanning direction of the imaging surface are conducted. Then, as the substrate 13 is movable within a prescribed extent on the lens tube 11a, adjustments (an adjustment of the rotation of the CCD 13 and an adjustment of centering of the center of the CCD 13) within a plane intersecting orthogonally the optical axis are conducted in a state of being positioned in the optical axis direction of the imaging surface of the CCD 13 and in the fanning direction. In such a way, by conducting the positionings using the substrate 14, which is large

compared with the CCD 13, a positioning of the CCD 13 can be facilitated.

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[Date of final disposal for application]

[Patent number] 3547869

[Date of registration] 23.04.2004

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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## CLAIMS

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### [Claim(s)]

[Claim 1] It is the approach the bare chip CCD characterized by positioning of said bare chip CCD positioning said substrate to a camera cone in the approach the bare chip CCD which forms a bare chip CCD in a substrate and attaches this substrate in the camera cone which supports optical system should cling should cling.

[Claim 2] It is the approach said substrate has the terminal formed in the periphery of the penetrated hole and this hole, said bare chip CCD is formed in the periphery of the image pick-up side which counters the open field of the hole of said substrate, and this image pick-up side, it has the terminal connected to the terminal of said substrate, and the bare chip CCD according to claim 1

characterized by closing the clearance between said substrates and said bare chips CCD with a bulking agent should cling.

[Claim 3] Anchoring with said substrate and said camera cone is the approach the bare chip CCD according to claim 1 or 2 characterized by being either if few among adhesion or a \*\*\*\* stop should cling.

[Claim 4] the bare chip CCD anchoring side of said substrate, and the field of the opposite side -- the open field of said hole -- a wrap -- claim 1 characterized by attaching a light filter like thru/or 3 -- the approach the bare chip CCD of a publication should cling to either.

[Claim 5] claim 1 characterized by preparing the light filter which fits into said hole in the bare chip CCD anchoring side of said substrate, and the field of the opposite side thru/or 3 -- the approach the bare chip CCD of a publication should cling to either.

[Claim 6] It is the approach said filter should be a laminated structure which consists of a filter of two or more sheets, the filter by the side of a substrate should fit into the hole which said substrate penetrated, and the bare chip CCD according to claim 4 or 5 characterized by the filter by the side of an anti-substrate being structure with a stage which is a bigger configuration than said hole should cling.

[Claim 7] claim 1 characterized by making said adhesion over the perimeter of a

camera cone thru/or 3 -- the approach the bare chip CCD of a publication should cling to either.

[Claim 8] Positioning within the flat surface which intersects perpendicularly to the optical axis of said substrate is the approach the bare chip CCD according to claim 1 characterized by adjusting said substrate while carrying out monitoring of the image from said bare chip CCD should cling.

[Claim 9] Positioning within the flat surface which intersects perpendicularly to the optical axis of said substrate is the approach the bare chip CCD according to claim 1 characterized by carrying out with the positioning structure formed in said camera cone and said substrate should cling.

[Claim 10] It is the approach the bare chip CCD according to claim 1 characterized by dashing said substrate against the flat surface which positioning of the direction of a gate is prepared in said camera cone as the direction of an optical axis of said bare chip CCD, and positioning of the direction of said optical axis is made, and intersects perpendicularly to said optical axis should cling.

[Claim 11] The approach the bare chip CCD of the publication according to claim 9 or 10 characterized by pressing fit the elastic member which prepares the stop section which an opposed face with the bare chip CCD of a light filter and the field of the opposite side contact in the container liner side of said camera cone,

and contacts the container liner side of said camera cone at the perimeter over the opposed face and said substrate with a bare chip CCD of said light filter should cling.

[Claim 12] The approach the bare chip CCD according to claim 1 characterized by not performing adjustment within the flat surface which intersects perpendicularly to an optical axis using the bare chip CCD with bigger effective pixel area than the area needed by optical system should cling.

[Claim 13] The approach the bare chip CCD according to claim 1 characterized by adding a focus gap amendment circuit and not justifying the direction of a gate should cling.

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#### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention forms a bare chip CCD in a substrate, and relates to the approach the bare chip CCD which attaches this substrate in the camera cone which supports optical system should cling.

[0002]

[Description of the Prior Art] Next, the conventional example is explained using a drawing. Drawing 23 is drawing explaining an example of the attaching structure of the CCD chip enclosed with the conventional package.

[0003] In drawing, 1 is a camera cone which supports optical system 2. 3 is the substrate with which the package CCD 4 was formed, and is attached in the end face section of a camera cone 1. The CCD chip 6 is formed in the boxes 5, such as a ceramic by which the whole surface was opened wide, and, as for the package CCD 4, said CCD chip 6 is enclosed by the wrap glass plate 7 in the box 5 in the open field of a box 5.

[0004] 8 is a light filter which consists of a crystal filter, an infrared cut-off filter, etc. heights 1a which 9 was arranged between the light filter 8 and the package CCD 4, and was prepared in the container liner side of a camera cone 1 -- said light filter 8 -- pushing -- positioning of a light filter 8 -- \*\*\*\*\* -- they are elastic members, such as rubber and resin.

[0005] Moreover, since the closed space which consists of an elastic member 9 and a light filter 8 is formed on a glass plate 7, it has prevented that dust etc.

adheres on a glass plate 7. A package CCD 4 is supplied to a commercial scene, where positioning with the CCD chip 6 and a box 5 is made. Therefore, positioning to the optical system 2 of the CCD chip 6 was made by positioning the box 5 with easy positioning to optical system.

[0006]

[Problem(s) to be Solved by the Invention] In recent years, supplying a commercial scene in the state of the CCD chip (bare chip CCD) 6 of a naked condition is proposed instead of the package CCD 4. The method of cling for the optical system of such a bare chip CCD is not proposed at all.

[0007] This invention was made in view of the above-mentioned trouble, and the 1st purpose has positioning in offering how the easy bare chip CCD should cling. Moreover, the 2nd purpose of this invention is to offer how the bare chip CCD with which dust etc. does not adhere to the image pick-up side of a bare chip CCD should cling.

[0008]

[Means for Solving the Problem] The approach the bare chip CCD of this invention which solves the above-mentioned technical problem should cling forms a bare chip CCD in a substrate, and positioning of said bare chip positions said substrate to a camera cone in the approach the bare chip CCD which attaches this substrate in the camera cone which supports optical system should

cling.

[0009] By positioning using a big substrate compared with a bare chip CCD, positioning is easy. Said substrate has the terminal formed in the periphery of the penetrated hole and this hole here, said bare chip CCD is formed in the periphery of the image pick-up side which counters the open field of the hole of said substrate, and this image pick-up side, it has the terminal connected to the terminal of said substrate, and, as for the clearance between said substrates and said bare chips CCD, closing with a bulking agent is desirable.

[0010] By having closed the clearance between a substrate and a bare chip CCD with the bulking agent, the invasion of dust etc. to the interior of a camera cone from the camera cone outside is prevented, and adhesion of dust etc. in a bare chip CCD can be prevented further.

[0011] Moreover, when there is little anchoring with said substrate and said camera cone among adhesion or a \*\*\* stop, it is desirable that it is either. A light filter may be attached in the bare chip CCD anchoring side of said substrate, and the field of the opposite side so that the open field of said hole may be covered.

[0012] By doing in this way, the closed space formed with the wall surface and light filter of a hole on the image pick-up side of a bare chip CCD is formed, and adhesion of the dust to the image pick-up side of a bare chip CCD can be prevented.

[0013] Furthermore, distance of the image pick-up side of CCD and a light filter is short made compared with the case where the conventional package CCD is used, in the case of the low pass filter according [ a light filter ] to \*\*\*\*, the analysis effectiveness becomes large and generating of moire can be suppressed.

[0014] Furthermore, the degree of freedom on a miniaturization or an optical design becomes large again because the distance of optical system and an image pick-up side becomes short. Moreover, you may make it prepare the light filter which fits into said hole in the bare chip CCD anchoring side of said substrate, and the field of the opposite side.

[0015] By doing in this way, in addition to the above-mentioned effectiveness, positioning of the light filter itself also becomes easy and contributes to reduction of a man day, and cost reduction. Furthermore, said filter is a laminated structure which consists of a filter of two or more sheets, the filter by the side of a substrate fits into the hole which said substrate penetrated, and its filter by the side of an anti-substrate is good also as structure with a stage which is a bigger configuration than said hole.

[0016] A possibility that a light filter may be generated by a crack and deformation in an image pick-up side in the image pick-up side of a bare chip CCD by setting up shorter than the depth of the hole of a substrate the thickness

of the part which fits into the hole of a light filter disappears.

[0017] Moreover, as for said adhesion, being made over the perimeter of a camera cone is desirable. By performing adhesion over the perimeter of a camera cone, it can prevent that dust etc. invades in a camera cone from the clearance between a substrate and a camera cone.

[0018] As the 1st example of the approach of positioning within the flat surface which intersects perpendicularly to the optical axis of a substrate, carrying out monitoring of the image from said bare chip CCD, there is a method of adjusting said substrate and there are some which are performed with the positioning structure formed in said camera cone and said substrate as the 2nd example.

[0019] Furthermore, there is the approach of dashing said substrate against the flat surface which positioning of the direction of a gate is prepared in said camera cone as the direction of an optical axis of said bare chip CCD, and positioning of the direction of said optical axis is made, and intersects perpendicularly to said optical axis.

[0020] Thus, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having poked positioning of the direction of a gate as the direction of an optical axis, and having counted on. Furthermore, since migration of the direction of an optical axis is regulated, the adjustment within the flat surface which intersects perpendicularly to an optical axis (rotation,

inside centering) becomes easy.

[0021] As an example of positioning of the direction of a gate by the above-mentioned optical axis, the stop section which an opposed face with the bare chip CCD of a light filter and the field of the opposite side contact is prepared in the container liner side of said camera cone, and there is the approach of pressing fit the elastic member which contacts the container liner side of said camera cone at the perimeter over the opposed face and said substrate with a bare chip CCD of said light filter.

[0022] By doing in this way, the closed space which consists of an elastic member and a light filter is formed on the image pick-up side of a bare chip CCD, and adhesion of the dust to the image pick-up side of a bare chip CCD can be prevented.

[0023] Furthermore, it can do short, and in the case of the low pass filter according [ a light filter ] to \*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD and a light filter does not use the box compared with the case where the conventional package CCD is used can suppress generating of moire.

[0024] Moreover, also in the case of the conventional package CCD, such an elastic member is used as shown in drawing 23, but since it has the structure of contacting a package CCD 4 top by pressing in the case of the conventional

example, the bore of an elastic member cannot be set up greatly. However, since the elastic member of this invention approach is contacted by pressing in a substrate, a bore can be set up greatly. Therefore, a large distance of a photographic subject beam of light and the wall of an elastic member can be taken, and it is hard to generate an optical trouble (the flare, ghost).

[0025] There is also a method of not performing adjustment within the flat surface which intersects perpendicularly to an optical axis using the bare chip CCD with the bigger effective pixel area as the approach of positioning than the area needed by optical system.

[0026] Namely, what is necessary is that unnecessary image data will not just use it using the bare chip CCD which has a big image pick-up side as for which the image obtained by optical system surely carries out image formation to an image pick-up side even if it attaches a substrate in a camera cone rough.

[0027] Moreover, a focus gap amendment circuit is added and there is also an approach which does not justify the direction of a gate.

[0028]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained using a drawing.

(1) Set example drawing 1 of a gestalt of the 1st operation in the decomposition perspective view of the example of a gestalt of operation of the 1st of this

invention, set drawing 2 to drawing 1, and drawing after an assembly, the sectional view of the direction [ in / in drawing 3 / drawing 2 ] of an optical axis, the direction view Fig. [ in / in drawing 4 / drawing 2 ] of A, and drawing 5 are drawings explaining anchoring with the substrate and bare chip CCD in drawing 1.

[0029] In these drawings, the cross-section configuration in which 11 supports optical system 12 is a rectangular camera cone. 14 is the rectangular substrate with which the bare chip CCD 13 was formed. Next, anchoring with a bare chip CCD 13 and a substrate 14 is explained using drawing 5. Penetrated hole 14a is formed in a substrate 14, and terminal 14b is further formed in the periphery of hole 14a.

[0030] On the other hand, a bare chip CCD 13 is arranged so that image pick-up side 13a may counter the open field of hole 14a of a substrate 14. Moreover, terminal 13b which uses solder 15 for terminal 14b of a substrate 14, and is connected to it is formed in the periphery of image pick-up side 13a.

[0031] And the closure of the clearance between a substrate 14 and a bare chip CCD 13 is carried out with the bulking agents 16, such as adhesives which have insulation. Next, anchoring with the substrate 14 and camera cone 11 in which the bare chip CCD 13 was formed using drawing 1 - drawing 4, and the justification approach are explained. Rectangular notching 14b is formed in the

abbreviation center section of each side of the rectangular substrate 14. On the other hand, on end-face 11a of a camera cone 11, four engagement pawl 11b which can engage with each notching 14b of a substrate 14 is formed.

[0032] from 11d of bending sections which each [ these ] engagement pawl 11b extends in the direction of an optical axis from end-face 11a, and a cross-section configuration bends toward the direction of an optical axis, and counters with a substrate 14 from the point of rectangular base 11c and base 11c -- from -- it is constituted. And the cross-section configuration of base 11c is set up smaller than notching 14b of a substrate 14. Therefore, substrate 11b is movable also in the condition that engagement pawl 11b is engaging with the substrate 14, within the limits of predetermined in the end-face 11a top of a camera cone 11.

[0033] Moreover, the opposed face with the substrate 14 of 11d of bending sections is datum-level 11e. This datum-plane 11e is a flat surface which intersects perpendicularly to an optical axis, and when the substrate 14 with which the bare chip CCD 13 was formed contacts, positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made.

[0034] Moreover, as shown in drawing 3 , in the camera cone 11, the light filters 17, such as a crystal filter and an infrared cut-off filter, are arranged. 11f of stop sections which an opposed face with the bare chip CCD 13 of a light filter 17 and

the field of the opposite side contact is prepared in the container liner side of a camera cone 11, and the elastic members 18 which contact the perimeter covering the container liner side of a camera cone 11, such as rubber and resin, are further pressed fit between the opposed face with the bare chip CCD 13 of a light filter 17, and the substrate 14.

[0035] Next, the adjustment approach of the above-mentioned configuration is explained. According to the elastic force of the elastic member 18 pressed fit, the substrate 14 with which the bare chip CCD 13 was formed runs against datum-plane 11e of engagement pawl 11b (contacting by pressing), and positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made.

[0036] Next, since the substrate 13 is movable within the limits of predetermined in the end-face 11a top of a camera cone 11, it is in the condition that positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate were made, and adjustment within the flat surface which intersects perpendicularly to an optical axis as shown in drawing 4 (rotation adjustment, inside centering adjustment) is performed. In addition, this rotation adjustment and inside centering adjustment picturize a predetermined test pattern, and adjust by displaying the image data from a bare chip CCD 13 on a monitor.

[0037] And if these adjustments are completed, engagement pawl 11b and a substrate 14 will be pasted up using adhesives 19. According to the above-mentioned approach, positioning becomes easy by positioning using the big substrate 14 compared with a bare chip CCD 13.

[0038] Moreover, the substrate 14 with which the bare chip CCD 13 was formed can run against datum-plane 11e of engagement pawl 11b according to the elastic force of the elastic member 18 pressed fit (contacting by pressing), and as it is in the condition that positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate were made and is shown in drawing 16, adjustment within the flat surface which intersects perpendicularly to an optical axis (rotation adjustment, inside centering adjustment) can be performed easily.

[0039] Moreover, by having closed the clearance between a substrate 14 and a bare chip CCD 13 with the bulking agent, the invasion of dust etc. to the camera cone 11 interior from the camera cone 11 outside is prevented, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 etc. can be prevented further.

[0040] Furthermore, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having made positioning of the direction of a gate into the thrust reliance to datum-level 11e of a substrate 14 in

the direction of an optical axis.

[0041] Furthermore, the closed space which consists of an elastic member 18 and a light filter 17 is formed on the image pick-up side of a bare chip CCD 13 again, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 can be prevented.

[0042] Moreover, compared with the case where the conventional package CCD is used, it can do short, and in the case of the low pass filter according [ a light filter 17 ] to \*\*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD 13 and a light filter 17 is not using the box can suppress generating of moire.

[0043] Furthermore, also in the case of the conventional package [ as shown in drawing 23 ] CCD, the elastic member 18 in the example of a gestalt of this operation is used, but since it has the structure of contacting Package CCD top by pressing in the case of the conventional example, it cannot set up the bore of an elastic member greatly. However, since it contacts by pressing in a substrate 14, the elastic member 18 of the example of a gestalt of this operation can set up a bore greatly. Therefore, a large distance of a photographic subject beam of light and the wall of an elastic member can be taken, and it is hard to generate an optical trouble (the flare, ghost).

(2) Explain the 2nd example of a gestalt of this invention using the example of a

gestalt, next drawing 6 of the 2nd operation. Drawing 6 is the block diagram of the principal part of the example of a gestalt of the 2nd operation. In addition, the same sign is given to the same part as drawing 1 explaining the example of a gestalt of operation of the 1st of this invention - drawing 5, and those explanation is omitted.

[0044] The difference between the example of a gestalt of this operation and the example of a gestalt of the 1st operation is the approach of positioning within the flat surface which intersects perpendicularly to the optical axis of a substrate. In \*\*\*\*, in the example of a gestalt of the 1st operation, the adjustment within the flat surface which intersects perpendicularly to the optical axis of a substrate 14 (rotation adjustment, inside centering adjustment) picturized the predetermined test pattern, and adjusted by displaying the image data from a bare chip CCD 13 on a monitor.

[0045] In the example of a gestalt of this operation, as shown in drawing 7, it is the point which set the end face side of a camera cone 11 to datum-level 11j of the direction of an optical axis of a substrate 14, it dashed, and 11h of projections was perpendicularly dashed against the top face of a end face side, formed projection 11i, and formed in the substrate 14 the notching 14h and 14i horizontal to one side face of a end face side which engages with these thrust reliance projections 11h and 11i.

[0046] Where according to such a configuration it pushed the substrate 14 against datum-level 11j of a camera cone 11 and positioning of the direction of an optical axis of a substrate 14 is made in the end face side of a camera cone 11, 11h of notching of a substrate 14 dashes, and 11h of projections by it being alike and contacting Horizontal positioning of a substrate 14 by the end face side of a camera cone 11 dashing, and contacting projection 11i [ notching 11i of a substrate 14 ] positioning of the perpendicular direction of a substrate 14 -- moreover, positioning of the hand of cut of a substrate 14 is made, respectively because a camera cone 11 dashes and the notching 14h and 14i of a substrate engages with Projections 11h and 11i.

[0047] In addition, the example of a gestalt of this operation is not limited to the example of a gestalt of the above-mentioned implementation. horizontal to one side face of the end face side of a camera cone 11 in the example of a gestalt of the above-mentioned implementation -- horizontal to the other-end side of the end face side of a camera cone 11, although it dashed, 11h of projections was perpendicularly dashed against the top face of a end face side and projection 11i was formed -- it may dash, a projection may be perpendicularly dashed against the inferior surface of tongue of a end face side, and a projection may be formed.

[0048] Moreover, in the above-mentioned positioning device, even if it dashes and does not make strict dimensional accuracy of Projections 11h and 11i and

notching 14h and 14i, a center position arrangement of a substrate 14 is avoidable by setting up more greatly the image pick-up area of the optical system of a camera cone 11, and setting up more greatly the image pick-up area of CCD explained in the example of a gestalt of the 12th operation of the after-mentioned.

(3) Explain the 3rd example of a gestalt of this invention using the example of a gestalt, next drawing 7 of the 3rd operation. Drawing 7 is the block diagram of the principal part of the example of a gestalt of the 3rd operation. In addition, the same sign is given to the same part as drawing 6 explaining the example of a gestalt of operation of the 2nd of this invention, and those explanation is omitted.

[0049] The difference between the example of a gestalt of this operation and the example of a gestalt of the 2nd operation is a point which formed two projections 11k and 11l. in the camera cone 11, and formed 11l. of holes which engage with notching hole 14k which engages with a substrate 14 at projection 11k of a camera cone 11, and 11l. of projections of a camera cone 11.

[0050] According to the above-mentioned configuration, a substrate 14 is pushed against datum-level 11j of a camera cone 11, and positioning on a perpendicular flat surface (rotation adjustment, inside centering adjustment) is made to the optical axis of a substrate 14 because the notching holes 14k and 14L of a substrate 14 fit into the projections 11k and 11L of a camera cone 11

where positioning of the direction of an optical axis of a substrate 14 is made.

[0051] Moreover, even if it dashes and does not make strict dimensional accuracy of Projections 11h and 11i and notching 14h and 14i in the above-mentioned positioning device like the example of a configuration of the 2nd operation A center position arrangement of a substrate 14 is avoidable by setting up more greatly the image pick-up area of the optical system of a camera cone 11, and setting up more greatly the image pick-up area of CCD explained in the example of a gestalt of the 12th operation of the after-mentioned.

(4) Explain the example of a gestalt of the 4th operation using the example of a gestalt next drawing 8 , and drawing 9 of the 4th operation. It is a perspective view [ in / drawing 8 , and / in drawing 9 / drawing 8 ] for the principal part. [ the cross-section block diagram of the example of a gestalt of the 4th operation ]

[0052] In addition, in drawing 8 and drawing 9 , the same sign is given to the same part as drawing 5 from drawing 1 of the example of a gestalt of the 1st operation, and those explanation is omitted. In these drawings, the end face of a camera cone 21 is a flat surface which intersects perpendicularly to an optical axis, and when the substrate 14 with which the bare chip CCD 13 was formed contacts, it has become datum-level 21a by which positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made.

[0053] Next, the adjustment approach of the above-mentioned configuration is explained. Adjustment within the flat surface which intersects perpendicularly to an optical axis where [ dashed the substrate 14 with which the bare chip CCD 13 was formed against datum-plane 21a of a camera cone 21 ] it is a condition, namely, positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made (rotation adjustment, inside centering adjustment) is performed. In addition, this rotation adjustment and inside centering adjustment picturize a predetermined test pattern, and adjust by displaying the image data from a bare chip CCD 13 on a monitor.

[0054] And if these adjustments are completed, the boundary part of a camera cone 21 and a substrate 14 will be pasted up using adhesives 22 over the perimeter. According to the above-mentioned approach, positioning becomes easy by positioning using the big substrate 14 compared with a bare chip CCD 13.

[0055] Moreover, a substrate 14 can be dashed against datum-plane 21a of a camera cone 21, and adjustment within the flat surface which intersects perpendicularly to an optical axis where positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made (rotation adjustment, inside centering adjustment)

can be performed easily.

[0056] By having pasted up the boundary part of a camera cone 21 and a substrate 14 using adhesives 22 over the perimeter, by having closed the clearance between a substrate 14 and a bare chip CCD 13 with the bulking agent, the invasion of dust etc. to the camera cone 11 interior from the camera cone 11 outside is prevented, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 etc. can be prevented further again.

[0057] Furthermore, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having made positioning of the direction of a gate into the thrust reliance to datum-level 21a of a substrate 14 in the direction of an optical axis.

[0058] Moreover, compared with the case where the conventional package CCD is used, it can do short, and in the case of the low pass filter according [ a light filter 17 ] to \*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD 13 and a light filter 17 is not using the box can suppress generating of moire.

(5) Explain the example of a gestalt of the 5th operation using the example of a gestalt, next drawing 10 of the 5th operation. Drawing 10 is a sectional view explaining the example of a gestalt of the 5th operation. In addition, in drawing 10, the same sign is given to the same part as drawing 5 from drawing 1 of the

example of a gestalt of the 1st operation, and those explanation is omitted.

[0059] In these drawings, the end face of a camera cone 31 is a flat surface which intersects perpendicularly to an optical axis, and when the substrate 14 with which the bare chip CCD 13 was formed contacts, it has become datum-level 31a by which positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made. Two or more female screw hole 31b in an abbreviation same pitch is formed on the same periphery at this datum-plane 31a.

[0060] Moreover, 14d of holes which also counter a substrate 14 at female screw hole 31b is formed. In addition, 14d of holes is the slot of the shape of radii of bigger width of face than the path of female screw hole 31b. Next, the adjustment approach of the above-mentioned configuration is explained.

Adjustment within the flat surface which intersects perpendicularly to an optical axis where [ dashed the substrate 14 with which the bare chip CCD 13 was formed against datum-plane 31a of a camera cone 31 ] it is a condition, namely, positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made (rotation adjustment, inside centering adjustment) is performed. In addition, this rotation adjustment and inside centering adjustment picturize a predetermined test pattern, and adjust by displaying the image data from a bare chip CCD 13 on a

monitor.

[0061] And if these adjustments are completed, a substrate 14 is fixed to a camera cone 31 using \*\*\*\* 32 and the spring washer 33 which can be screwed in female screw hole 31b. Furthermore, adhesives 34 are applied for the boundary part of a camera cone 31 and a substrate 14 over the perimeter.

[0062] According to the above-mentioned approach, positioning becomes easy by positioning using the big substrate 14 compared with a bare chip CCD 13. Moreover, a substrate 14 can be dashed against datum-plane 31a of a camera cone 31, and adjustment within the flat surface which intersects perpendicularly to an optical axis where positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made (rotation adjustment, inside centering adjustment) can be performed easily.

[0063] By having applied the boundary part of a camera cone 21 and a substrate 14 using adhesives 22 over the perimeter, by having closed the clearance between a substrate 14 and a bare chip CCD 13 with the bulking agent, the invasion of dust etc. to the camera cone 11 interior from the camera cone 11 outside is prevented, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 etc. can be prevented further again.

[0064] Furthermore, the effect by telescopic motion of aging in approaches, such

as adhesion, humidity, etc. decreases by having made positioning of the direction of a gate into the thrust reliance to datum-level 31a of a substrate 14 in the direction of an optical axis.

[0065] Moreover, compared with the case where the conventional package CCD is used, it can do short, and in the case of the low pass filter according [ a light filter 17 ] to \*\*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD 13 and a light filter 17 is not using the box can suppress generating moire.

[0066] In addition, this invention is not limited to the example of a gestalt of the above-mentioned implementation. In the example of a gestalt of the above-mentioned implementation, although anchoring with a substrate 14 and a camera cone 31 was acceptable \*\*\*\* 32 and screwing to tapped hole 31b performed it, anchoring with a substrate 14 and a camera cone 31 may be performed using a tapping screw.

(6) Explain the example of a gestalt of the 6th operation using the example of a gestalt next drawing 11 , and drawing 12 of the 6th operation. It is a perspective view [ in / drawing 11 , and / in drawing 12 / drawing 11 ] for the principal part. [ the cross-section block diagram of the example of a gestalt of the 6th operation ] In addition, in drawing 11 and drawing 12 , the same sign is given to the same part as drawing 8 of the example of a gestalt of the 4th operation, and

drawing 9 , and those explanation is omitted.

[0067] The difference between the example of a gestalt of this operation and the example of a gestalt of the 4th operation Press fit the elastic member 41 which contacts the internal-surface perimeter of a camera cone 21 over a light filter 17 and a substrate 14, and anchoring with the substrate 14 and camera cone 21 using adhesives 42 As adhesives 42 are not applied over the perimeter of a camera cone but it is shown in drawing 12 , it is the point limited to the key point (the abbreviation center section of each side near [ Specifically ]).

[0068] According to the above-mentioned approach, positioning becomes easy by positioning using the big substrate 14 compared with a bare chip CCD 13. Moreover, a substrate 14 can be dashed against datum-plane 21a of a camera cone 21, and adjustment within the flat surface which intersects perpendicularly to an optical axis where positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a gate are made (rotation adjustment, inside centering adjustment) can be performed easily.

[0069] Moreover, by having closed the clearance between a substrate 14 and a bare chip CCD 13 with the bulking agent, the invasion of dust etc. to the camera cone 11 interior from the camera cone 11 outside is prevented, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 etc. can be prevented

further.

[0070] Furthermore, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having made positioning of the direction of a gate into the thrust reliance to datum-level 21a of a substrate 14 in the direction of an optical axis.

[0071] Furthermore, the closed space which consists of an elastic member 41 and a light filter 17 is formed on the image pick-up side of a bare chip CCD 13 again, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 can be prevented.

[0072] Moreover, compared with the case where the conventional package CCD is used, it can do short, and in the case of the low pass filter according [ a light filter 17 ] to \*\*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD 13 and a light filter 17 is not using the box can suppress generating of moire.

[0073] Furthermore, also in the case of the conventional package [ as shown in drawing 23 ] CCD, the elastic member 41 in the example of a gestalt of this operation is used, but since it has the structure of contacting Package CCD top by pressing in the case of the conventional example, it cannot set up the bore of an elastic member greatly. However, since it contacts by pressing in a substrate 14, the elastic member 41 of the example of a gestalt of this operation can set up

a bore greatly. Therefore, a large distance of a photographic subject beam of light and the wall of an elastic member can be taken, and it is hard to generate an optical trouble (the flare, ghost).

(7) Explain the example of a gestalt of the 7th operation using the example of a gestalt, next drawing 13 of the 7th operation. Drawing 13 is the cross-section block diagram of the example of a gestalt of the 7th operation. In addition, in drawing 13, the same sign is given to the same part as drawing 10 of the example of a gestalt of the 5th operation, and those explanation is omitted.

[0074] The difference between the example of a gestalt of this operation and the example of a gestalt of the 5th operation is a point of pressing fit the elastic member 51 which contacts the internal-surface perimeter of a camera cone 21 over a light filter 17 and a substrate 14, and not performing spreading covering the camera cone perimeter of adhesives like the example of a gestalt of the 5th operation.

[0075] According to the above-mentioned approach, positioning becomes easy by positioning using the big substrate 14 compared with a bare chip CCD 13. Moreover, a substrate 14 can be dashed against datum-plane 31a of a camera cone 31, and adjustment within the flat surface which intersects perpendicularly to an optical axis where positioning of the direction of an optical axis of the image pick-up side of a bare chip CCD 13 and positioning of the direction of a

gate are made (rotation adjustment, inside centering adjustment) can be performed easily.

[0076] Moreover, by having closed the clearance between a substrate 14 and a bare chip CCD 13 with the bulking agent, the invasion of dust etc. to the camera cone 11 interior from the camera cone 11 outside is prevented, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 etc. can be prevented further.

[0077] Furthermore, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having made positioning of the direction of a gate into the thrust reliance to datum-level 31e of a substrate 14 in the direction of an optical axis.

[0078] Furthermore, the closed space which consists of an elastic member 51 and a light filter 17 is formed on the image pick-up side of a bare chip CCD 13 again, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 can be prevented.

[0079] Moreover, compared with the case where the conventional package CCD is used, it can do short, and in the case of the low pass filter according [ a light filter 17 ] to \*\*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD 13 and a light filter 17 is not using the box can suppress generating of moire.

[0080] Furthermore, also in the case of the conventional package [ as shown in drawing 23 ] CCD, the elastic member 41 in the example of a gestalt of this operation is used, but since it has the structure of contacting Package CCD top by pressing in the case of the conventional example, it cannot set up the bore of an elastic member greatly. However, since it contacts by pressing in a substrate 14, the elastic member 41 of the example of a gestalt of this operation can set up a bore greatly. Therefore, a large distance of a photographic subject beam of light and the wall of an elastic member can be taken, and it is hard to generate an optical trouble (the flare, ghost).

(8) Explain the example of a gestalt of the 8th operation using example drawing 14 of a gestalt and drawing 15 of the 8th operation. It is a perspective view [ in / drawing 14 , and / in drawing 15 / drawing 14 ]. [ the cross-section block diagram of the example of a gestalt of the 8th operation ] In addition, in drawing 14 and drawing 15 , the back with the same is given to the same part as drawing 5 in the example of a gestalt of the 1st operation, and those explanation is omitted into it.

[0081] The example of a gestalt of this operation is the approach a light filter should cling. That is, the light filter in the example of a gestalt of the 1st - the 7th operation was what is attached in the internal surface of a camera cone. In the example of a gestalt of this operation, as shown in drawing 14 and drawing 15 , a light filter 61 is attached in the bare chip CCD anchoring side of a substrate 14,

and the field of the opposite side using adhesives 62 so that the open field of hole 14a may be covered.

[0082] By doing in this way, the closed space formed with the wall surface and light filter 61 of hole 14a on the image pick-up side of a bare chip CCD 13 is formed, and adhesion of the dust to the image pick-up side of a bare chip CCD 13 can be prevented.

[0083] Furthermore, distance of the image pick-up side of a bare chip CCD 13 and a light filter 61 is short made compared with the case where the conventional package CCD is used, in the case of the low pass filter according [ a light filter 61 ] to \*\*\*\*\*, the analysis effectiveness becomes large and generating of moire can be suppressed.

[0084] Furthermore, the degree of freedom on a miniaturization or an optical design becomes large again because the distance of optical system and an image pick-up side becomes short.

(9) Explain the example of a gestalt of the 9th operation using example drawing 16 of a gestalt and drawing 17 of the 9th operation. It is a perspective view [ in / drawing 16 , and / in drawing 17 / drawing 16 ]. [ the cross-section block diagram of the example of a gestalt of the 9th operation ] In addition, in drawing 16 and drawing 17 , the back with the same is given to the same part as drawing 5 in the example of a gestalt of the 1st operation, and those explanation is omitted into it.

The example of a gestalt of this operation is also the approach a light filter should cling.

[0085] In the example of a gestalt of this operation, as shown in drawing 16 and drawing 17, the light filter 71 which fits into hole 14a was formed in the bare chip CCD13 anchoring side of a substrate 14, and the field of the opposite side.

[0086] By doing in this way, in addition to the effectiveness in the example of a gestalt of the 8th operation, positioning of the light filter itself also becomes easy and reduction of a man day and cost reduction can be planned by doing in this way.

(10) Explain the example of a gestalt of the 10th operation using example drawing 18 of a gestalt and drawing 19 of the 10th operation. It is a perspective view [ in / drawing 18 , and / in drawing 19 / drawing 18 ]. [ the cross-section block diagram of the example of a gestalt of the 10th operation ] In addition, in drawing 18 and drawing 17 , the back with the same is given to the same part as drawing 5 in the example of a gestalt of the 1st operation, and those explanation is omitted into it. The example of a gestalt of this operation is also the approach a light filter should cling.

[0087] A light filter 81 is a laminated structure which consists of a filter of two or more sheets. Therefore, the light filter 81 by the side of a substrate 14 fitted into hole 14a which the substrate 14 penetrated, and made the light filter 81 by the

side of an anti-substrate the structure with a stage which is a bigger configuration than hole 14a.

[0088] A possibility that a light filter 81 may be generated by a crack and deformation in an image pick-up side in the image pick-up side of a bare chip CCD 13 by setting up shorter than the depth (D) of the hole of a substrate thickness t of the part which fits into hole 14a of a light filter 81 by doing in this way in addition to the effectiveness of the example of a gestalt of the 9th operation disappears.

(11) Explain the example of a gestalt of the 11th operation using example drawing 20 of a gestalt of the 11th operation. Drawing 20 is the block diagram of the example of a gestalt of the 11th operation.

[0089] In drawing, it is the substrate with which, as for 91, the camera cone was prepared and, as for 92, the bare chip CCD 93 was formed. A substrate 92 is formed in the body of image pick-up equipment, and is movable on a perpendicular flat surface to an optical axis.

[0090] 94 -- a substrate 92 -- an optical axis -- receiving -- abbreviation -- the spring horizontally energized on a perpendicular flat surface and 95 forbid horizontal migration of a substrate 92 -- it \*\*\*\*s and comes out. The spring with which 96 energizes a substrate 92 perpendicularly on a perpendicular flat surface to an optical axis, and 97 are \*\*\*\* which forbid migration of the

perpendicular direction of a substrate 92.

[0091] 98, the spring with which 99,100 energizes a substrate 92 in the direction of a gate on a perpendicular flat surface to an optical axis, and 101,102,103 are \*\*\*\* which regulate migration of the substrate 92 which was formed so that these springs 98 and 99,100 might be countered, and was instigated with springs 98 and 99,100.

[0092] The justification approach of the bare chip CCD 93 in such a configuration is explained. First, justification on a perpendicular flat surface is performed to the optical axis of a substrate 92. A predetermined test pattern is photoed using a bare chip CCD 93, and, specifically, the image right signal from a bare chip CCD 93 is copied on a monitor 105 through the video-signal processing circuit 104.

Looking at this monitor's 105 image, each \*\*\*\* 95 and 97,101,102,103 is adjusted and fueled and center position adjustment is performed.

[0093] Next, by fixing a camera cone 91 and a substrate 92 and rotating a camera cone 91, rotation adjustment is performed and, finally adjustment is ended for the camera cone rotation setscrew 106 in total. Thus, according to the approach, positioning becomes easy by positioning using the big substrate 92 compared with a bare chip CCD 93.

[0094] In addition, by this example, in anchoring with a bare chip CCD 93 and a substrate 92, when both parallelism is good, adjustment of a gate becomes

unnecessary and springs 98 and 99,100 and \*\*\* 101,102,103 become unnecessary.

(12) Explain the example of a gestalt of the 12th operation using example drawing 21 of a gestalt of the 12th operation. Drawing 21 is the block diagram of the example of a gestalt of the 12th operation. In addition, the same sign is given to the same part as drawing 20 explaining the example of a gestalt of the 11th operation, and those explanation is omitted.

[0095] The bare chip CCD 111 with which the example of a gestalt of this operation is established on a substrate 110 has the bigger effective pixel area D than the area C needed by optical system. Even if it attaches a substrate 110 in a camera cone rough according to such an approach, if unnecessary image data will not use it using the bare chip CCD 111 which has the big effective pixel area D as for which the image obtained by optical system surely carries out image formation to an image pick-up side, justification within the flat surface which intersects perpendicularly to the optical axis of a bare chip CCD 111 can be made unnecessary.

(13) Explain the example of a gestalt of the 13th operation using example drawing 22 of a gestalt of the 13th operation. Drawing 22 is the block diagram of the example of a gestalt of the 13th operation. In addition, the same sign is given to the same part as drawing 21 explaining the example of a gestalt of the 12th

operation, and those explanation is omitted.

[0096] In recent years, the technique of restoring a sharp image from the image with which the focus shifted, or the image which deteriorated under the effect of the hand deflection of a camera is proposed (for example, Shin-ichi the image recovery / Komatsu / Waseda University by the blind deconvolution, the 1991 22nd image-engineering conference per year).

[0097] This example amends the video output of a bare chip CCD 111 using the focus gap amendment circuit 120 which used the A/D-conversion circuit 121 and this technique. In case a bare chip CCD 111 is attached by doing in this way centering on an optical axis, even if it attaches the direction of a gate somewhat rough, it can recover the image which deteriorated by the gate by the focus gap amendment circuit 120.

[0098]

[Effect of the Invention] According to the approach the bare chip CCD of this invention should cling as stated above, positioning is easy by positioning using a big substrate compared with a bare chip CCD.

[0099] By having closed the clearance between a substrate and a bare chip CCD with the bulking agent, the invasion of dust etc. to the interior of a camera cone from the camera cone outside is prevented, and adhesion of dust etc. in a bare chip CCD can be prevented further.

[0100] The closed space formed with the wall surface and light filter of a hole on the image pick-up side of a bare chip CCD by attaching a light filter is formed in the bare chip CCD anchoring side of said substrate, and the field of the opposite side so that the open field of said hole may be covered, and adhesion of the dust to the image pick-up side of a bare chip CCD can be prevented.

[0101] Furthermore, distance of the image pick-up side of CCD and a light filter is short made compared with the case where the conventional package CCD is used, in the case of the low pass filter according [ a light filter ] to \*\*\*\*, the analysis effectiveness becomes large and generating of moire can be suppressed.

[0102] Furthermore, the degree of freedom on a miniaturization or an optical design becomes large again because the distance of optical system and an image pick-up side becomes short. Moreover, by having prepared the light filter which fits into said hole in the bare chip CCD anchoring side of said substrate, and the field of the opposite side, in addition to the above-mentioned effectiveness, positioning of the light filter itself also becomes easy and contributes to reduction of a man day, and cost reduction.

[0103] Furthermore, by said filter's being a laminated structure which consists of a filter of two or more sheets, and the filter by the side of a substrate having fitted into the hole which said substrate penetrated, and having made the filter by the

side of an anti-substrate into the structure with a stage which is a bigger configuration than said hole A possibility that a light filter may be generated by a crack and deformation in an image pick-up side in the image pick-up side of a bare chip CCD by setting up shorter than the depth of the hole of a substrate the thickness of the part which fits into the hole of a light filter disappears.

[0104] By performing adhesion over the perimeter of a camera cone, it can prevent that dust etc. invades in a camera cone from the clearance between a substrate and a camera cone. Furthermore, there is the approach of dashing said substrate against the flat surface which positioning of the direction of a gate is prepared in said camera cone as the direction of an optical axis of said bare chip CCD, and positioning of the direction of said optical axis is made, and intersects perpendicularly to said optical axis.

[0105] Thus, the effect by telescopic motion of aging in approaches, such as adhesion, humidity, etc. decreases by having poked positioning of the direction of a gate as the direction of an optical axis, and having counted on. Furthermore, since migration of the direction of an optical axis is regulated, the adjustment within the flat surface which intersects perpendicularly to an optical axis (rotation, inside centering) becomes easy.

[0106] As an example of positioning of the direction of a gate by the above-mentioned optical axis, the stop section which an opposed face with the

bare chip CCD of a light filter and the field of the opposite side contact is prepared in the container liner side of said camera cone, and there is the approach of pressing fit the elastic member which contacts the container liner side of said camera cone at the perimeter over the opposed face and said substrate with a bare chip CCD of said light filter.

[0107] By doing in this way, the closed space which consists of an elastic member and a light filter is formed on the image pick-up side of a bare chip CCD, and adhesion of the dust to the image pick-up side of a bare chip CCD can be prevented.

[0108] Furthermore, it can do short, and in the case of the low pass filter according [ a light filter ] to \*\*\*\*, the analysis effectiveness becomes large and only the part for which the distance of the image pick-up side of a bare chip CCD and a light filter does not use the box compared with the case where the conventional package CCD is used can suppress generating of moire.

[0109] Moreover, also in the case of the conventional package CCD, such an elastic member is used as shown in drawing 23, but since it has the structure of contacting a package CCD 4 top by pressing in the case of the conventional example, the bore of an elastic member cannot be set up greatly. However, since the elastic member of this invention approach is contacted by pressing in a substrate, a bore can be set up greatly. Therefore, a large distance of a

photographic subject beam of light and the wall of an elastic member can be taken, and it is hard to generate an optical trouble (the flare, ghost).

[0110] There is also a method of not performing adjustment within the flat surface which intersects perpendicularly to an optical axis using the bare chip CCD with the bigger effective pixel area as the approach of positioning than the area needed by optical system.

[0111] Namely, what is necessary is that unnecessary image data will not just use it using the bare chip CCD which has a big image pick-up side as for which the image obtained by optical system surely carries out image formation to an image pick-up side even if it attaches a substrate in a camera cone rough.

[0112] Moreover, a focus gap amendment circuit is added and there is also an approach which does not justify the direction of a gate.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view of the example of a gestalt of operation of the 1st of this invention.

[Drawing 2] In drawing 1 , it is drawing after an assembly.

[Drawing 3] It is the sectional view of the direction of an optical axis in drawing 2 .

[Drawing 4] It is the direction view Fig. of A in drawing 2 .

[Drawing 5] It is drawing explaining anchoring with the substrate and bare chip CCD in drawing 1 .

[Drawing 6] It is the block diagram of the principal part of the example of a gestalt of the 2nd operation.

[Drawing 7] It is the block diagram of the principal part of the example of a gestalt of the 3rd operation.

[Drawing 8] It is the cross-section block diagram of the example of a gestalt of the 4th operation.

[Drawing 9] It is a perspective view for the principal part in drawing 8 .

[Drawing 10] It is the cross-section block diagram of the example of a gestalt of the 5th operation.

[Drawing 11] It is the cross-section block diagram of the example of a gestalt of

the 6th operation.

[Drawing 12] It is a perspective view for the principal part in drawing 11 .

[Drawing 13] It is the cross-section block diagram of the example of a gestalt of the 7th operation.

[Drawing 14] It is the cross-section block diagram of the example of a gestalt of the 8th operation.

[Drawing 15] It is a perspective view in drawing 14 .

[Drawing 16] It is the cross-section block diagram of the example of a gestalt of the 9th operation.

[Drawing 17] It is a perspective view in drawing 16 .

[Drawing 18] It is the cross-section block diagram of the example of a gestalt of the 10th operation.

[Drawing 19] It is a perspective view in drawing 18 .

[Drawing 20] It is the block diagram of the example of a gestalt of the 11th operation.

[Drawing 21] It is the block diagram of the example of a gestalt of the 12th operation.

[Drawing 22] It is the block diagram of the example of a gestalt of the 13th operation.

[Drawing 23] It is drawing explaining an example of the attaching structure of the

CCD chip enclosed with the conventional package.

[Description of Notations]

11 Camera Cone

13 Bare Chip CCD

14 Substrate